



#14/a

## SEQUENCE LISTING

<110> Olaf Schneewind  
Sarkis Mazmanian  
Gwen Liu  
Hung Ton-That

<120> IDENTIFICATION OF SORTASE GENE

<130> 510015.213  
<140> US/09/292,437  
<141> 1999-04-15

<160> 36

<170> FastSEQ for Windows Version 3.0

<210> 1  
<211> 5  
<212> PRT  
<213> Bacteria

<220>  
<221> Unsure  
<222> 3  
<223> Any naturally-occurring amino acid

<400> 1  
Leu Pro Xaa Thr Gly  
1 5

<210> 2  
<211> 621  
<212> DNA  
<213> Staphylococcus aureus

<400> 2  
atg aaa aaa tgg aca aat cga tta atg aca atc gct ggt gtg gta ctt  
48 Met Lys Lys Trp Thr Asn Arg Leu Met Thr Ile Ala Gly Val Val Leu  
1 5 10 15

atc cta gtg gca gca tat ttg ttt gct aaa cca cat atc gat aat tat  
96 Ile Leu Val Ala Ala Tyr Leu Phe Ala Lys Pro His Ile Asp Asn Tyr  
20 25 30

ctt cac gat aaa gat gaa aag att gaa caa tat gat aaa aat  
144 Leu His Asp Lys Asp Lys Asp Glu Lys Ile Glu Gln Tyr Asp Lys Asn  
35 40 45

gta aaa gaa cag gcg agt aaa gat aaa aag cag caa gct aaa cct caa  
192 Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln Ala Lys Pro Gln  
50 55 60

att ccg aaa gat aaa tcg aaa gtg gca ggc tat att gaa att cca gat  
240 Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile Glu Ile Pro Asp  
65 70 75 80

gct gat att aaa gaa cca gta tat cca gga cca gca aca cct gaa caa

288

Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala Thr Pro Glu Gln  
85 90 95

tta aat aga ggt gta agc ttt gca gaa gaa aat gaa tca cta gat gat  
336

Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu Ser Leu Asp Asp  
100 105 110

caa aat att tca att gca gga cac act ttc att gac cgt ccg aac tat  
384

Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp Arg Pro Asn Tyr  
115 120 125

caa ttt aca aat ctt aaa gca gcc aaa aaa ggt agt atg gtg tac ttt  
432

Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser Met Val Tyr Phe  
130 135 140

aaa gtt ggt aat gaa aca cgt aag tat aaa atg aca agt ata aga gat  
480

Lys Val Gly Asn Glu Thr Arg Lys Tyr Lys Met Thr Ser Ile Arg Asp  
145 150 155 160

gtt aag cct aca gat gta gga gtt cta gat gaa caa aaa ggt aaa gat  
528

Val Lys Pro Thr Asp Val Gly Val Leu Asp Glu Gln Lys Gly Lys Asp  
165 170 175

aaa caa tta aca tta att act tgt gat gat tac aat gaa aag aca ggc  
576

Lys Gln Leu Thr Leu Ile Thr Cys Asp Asp Tyr Asn Glu Lys Thr Gly  
180 185 190

gtt tgg gaa aaa cgt aaa atc ttt gta gct aca gaa gtc aaa taa  
621

Val Trp Glu Lys Arg Lys Ile Phe Val Ala Thr Glu Val Lys \*  
195 200 205

<210> 3

<211> 206

<212> PRT

<213> Staphylococcus aureus

<400> 3

Met Lys Lys Trp Thr Asn Arg Leu Met Thr Ile Ala Gly Val Val Leu  
1 5 10 15

Ile Leu Val Ala Ala Tyr Leu Phe Ala Lys Pro His Ile Asp Asn Tyr  
20 25 30

Leu His Asp Lys Asp Lys Asp Glu Lys Ile Glu Gln Tyr Asp Lys Asn  
35 40 45

Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln Ala Lys Pro Gln  
50 55 60

Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile Glu Ile Pro Asp  
65 70 75 80

Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala Thr Pro Glu Gln  
85 90 95

Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu Ser Leu Asp Asp  
100 105 110

Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp Arg Pro Asn Tyr  
115 120 125

Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser Met Val Tyr Phe  
130 135 140

Lys Val Gly Asn Glu Thr Arg Lys Tyr Lys Met Thr Ser Ile Arg Asp

145                    150                    155                    160  
Val Lys Pro Thr Asp Val Gly Val Leu Asp Glu Gln Lys Gly Lys Asp  
165                    170                    175  
Lys Gln Leu Thr Leu Ile Thr Cys Asp Asp Tyr Asn Glu Lys Thr Gly  
180                    185                    190  
Val Trp Glu Lys Arg Lys Ile Phe Val Ala Thr Glu Val Lys  
195                    200                    205

<210> 4  
<211> 227  
<212> PRT  
<213> Streptococcus pyogenes

<400> 4  
Met Glu Glu Val Trp Gln Lys Ala Lys Ala Tyr Asn Ala Arg Leu Gly  
1                    5                    10                    15  
Thr Gln Pro Val Pro Asp Ala Phe Ser Phe Arg Asp Gly Ile His Asp  
20                    25                    30  
Lys Asn Tyr Glu Ser Leu Leu Gln Ile Glu Asn Asn Asp Ile Met Gly  
35                    40                    45  
Tyr Val Glu Val Pro Ser Ile Lys Val Thr Leu Pro Ile Tyr His Tyr  
50                    55                    60  
Thr Thr Asp Glu Val Leu Thr Lys Gly Ala Gly His Leu Phe Gly Ser  
65                    70                    75                    80  
Ala Leu Pro Val Gly Gly Asp Gly Thr His Thr Val Ile Ser Ala His  
85                    90                    95  
Arg Gly Leu Pro Ser Ala Glu Met Phe Thr Asn Leu Asn Leu Val Lys  
100                  105                  110  
Lys Gly Asp Thr Phe Tyr Phe Arg Val Leu Asn Lys Val Leu Ala Tyr  
115                  120                  125  
Lys Val Asp Gln Ile Leu Thr Val Glu Pro Asp Gln Val Thr Ser Leu  
130                  135                  140  
Ser Gly Val Met Gly Lys Asp Tyr Ala Thr Leu Val Thr Cys Thr Pro  
145                  150                  155                  160  
Tyr Gly Val Asn Thr Lys Arg Leu Leu Val Arg Gly His Arg Ile Ala  
165                  170                  175  
Tyr His Tyr Lys Tyr Gln Gln Ala Lys Lys Ala Met Lys Leu Val  
180                  185                  190  
Asp Lys Ser Arg Met Trp Ala Glu Val Val Cys Ala Ala Phe Gly Val  
195                  200                  205  
Val Ile Ala Ile Ile Leu Val Phe Met Tyr Ser Arg Val Ser Ala Lys  
210                  215                  220  
Lys Ser Lys  
225

<210> 5  
<211> 365  
<212> PRT  
<213> Actinomyces naeslundii

<400> 5  
Met Gly Leu Leu Thr Tyr Pro Thr Ala Ala Ser Trp Val Ser Gln Tyr  
1                    5                    10                    15  
Asn Gln Ser Lys Val Thr Ala Asp Tyr Ser Ala Gln Val Asp Gly Ala  
20                  25                  30  
Arg Pro Asp Ala Lys Thr Gln Val Glu Gln Ala His Ala Tyr Asn Asp  
35                  40                  45  
Ala Leu Ser Ala Gly Ala Val Leu Glu Ala Asn Asn His Val Pro Thr  
50                  55                  60  
Gly Ala Gly Ser Ser Lys Asp Ser Ser Leu Gln Tyr Ala Asn Ile Leu  
65                  70                  75                  80  
Lys Ala Asn Asn Glu Gly Leu Met Ala Arg Leu Lys Ile Pro Ser Ile  
85                  90                  95  
Ser Leu Asp Leu Pro Val Tyr His Gly Thr Ala Asp Asp Thr Leu Leu  
100                 105                 110

Lys Gly Leu Gly His Leu Glu Gly Thr Ser Leu Pro Val Gly Gly Glu  
 115 120 125  
 Gly Thr Arg Ser Val Ile Thr Gly His Arg Gly Leu Ala Glu Ala Thr  
 130 135 140  
 Met Phe Thr Asn Leu Asp Lys Val Lys Thr Gly Asp Ser Leu Ile Val  
 145 150 155 160  
 Glu Val Phe Gly Glu Val Leu Thr Tyr Arg Val Thr Ser Thr Lys Val  
 165 170 175  
 Val Glu Pro Glu Glu Thr Glu Ala Leu Arg Val Glu Glu Gly Lys Asp  
 180 185 190  
 Leu Leu Thr Leu Val Thr Cys Thr Pro Leu Gly Ile Asn Thr His Arg  
 195 200 205  
 Ile Leu Leu Thr Gly Glu Arg Ile Tyr Pro Thr Pro Ala Lys Asp Leu  
 210 215 220  
 Ala Ala Ala Gly Lys Arg Pro Asp Val Pro His Phe Pro Trp Trp Ala  
 225 230 235 240  
 Val Gly Leu Ala Ala Gly Leu Ile Val Val Gly Leu Tyr Leu Trp Arg  
 245 250 255  
 Ser Gly Tyr Ala Ala Ala Arg Ala Lys Glu Arg Ala Leu Ala Arg Ala  
 260 265 270  
 Arg Ala Ala Gln Glu Glu Pro Gln Pro Gln Thr Trp Ala Glu Gln Met  
 275 280 285  
 Arg Ile Trp Met Asp Asp Asp Ala Gly Val Glu Pro Gln Arg Trp Phe  
 290 295 300  
 Thr Asp Leu Pro Val Pro Pro Gln Pro Ser Glu Met Glu Asn Leu Ala  
 305 310 315 320  
 Leu Leu Glu Glu Ile Ala Ser Leu Ser Ala Pro Ser Gly Arg Trp Asp  
 325 330 335  
 Asp Gln Glu Leu Ile Asp Thr Ala Glu Ile Pro Val Leu Asp Ala Thr  
 340 345 350  
 Arg Pro Ser Ala Gly Thr Ser Gly Arg Thr His Arg Leu  
 355 360 365

<210> 6  
 <211> 284  
 <212> PRT  
 <213> Enterococcus faecalis

<400> 6

Met Lys Ser Lys Lys Lys Arg Arg Ile Ile Asp Gly Phe Met Ile Leu  
 1 5 10 15  
 Leu Leu Ile Ile Gly Ile Gly Ala Phe Ala Tyr Pro Phe Val Ser Asp  
 20 25 30  
 Ala Leu Asn Asn Tyr Leu Asp Gln Gln Ile Ile Ala His Tyr Gln Ala  
 35 40 45  
 Lys Ala Ser Gln Glu Asn Thr Lys Glu Met Ala Glu Leu Gln Glu Lys  
 50 55 60  
 Met Glu Lys Lys Asn Gln Glu Leu Ala Lys Lys Gly Ser Asn Pro Gly  
 65 70 75 80  
 Leu Asp Pro Phe Ser Glu Thr Gln Lys Thr Thr Lys Lys Pro Asp Lys  
 85 90 95  
 Ser Tyr Phe Glu Ser His Thr Ile Gly Val Leu Thr Ile Pro Lys Ile  
 100 105 110  
 Asn Val Arg Leu Pro Ile Phe Asp Lys Thr Asn Ala Leu Leu Leu Glu  
 115 120 125  
 Lys Gly Ser Ser Leu Leu Glu Gly Thr Ser Tyr Pro Thr Gly Gly Thr  
 130 135 140  
 Asn Thr His Ala Val Ile Ser Gly His Arg Gly Leu Pro Gln Ala Lys  
 145 150 155 160  
 Leu Phe Thr Asp Leu Pro Glu Leu Lys Lys Gly Asp Glu Phe Tyr Ile  
 165 170 175  
 Glu Val Asn Gly Lys Thr Leu Ala Tyr Gln Val Asp Gln Ile Lys Thr  
 180 185 190  
 Val Glu Pro Thr Asp Thr Lys Asp Leu His Ile Glu Ser Gly Gln Asp  
 195 200 205

Leu Val Thr Leu Leu Thr Cys Thr Pro Tyr Met Ile Asn Ser His Arg  
210 215 220  
Leu Leu Val Arg Gly His Arg Ile Pro Tyr Gln Pro Glu Lys Ala Ala  
225 230 235 240  
Ala Gly Met Lys Lys Val Ala Gln Gln Asn Leu Leu Leu Trp Thr  
245 250 255  
Leu Leu Leu Ile Ala Cys Ala Leu Ile Ile Ser Gly Phe Ile Ile Trp  
260 265 270  
Tyr Lys Arg Arg Lys Lys Thr Thr Arg Lys Pro Lys  
275 280

<210> 7  
<211> 246  
<212> PRT  
<213> Streptococcus mutans

<400> 7  
Met Lys Lys Glu Arg Gln Ser Arg Lys Lys Arg Ser Phe Leu Arg Thr  
1 5 10 15  
Phe Leu Pro Ile Leu Leu Leu Val Ile Gly Leu Ala Leu Ile Phe Asn  
20 25 30  
Thr Pro Ile Arg Asn Ala Leu Ile Ala Trp Asn Thr Asn Arg Tyr Gln  
35 40 45  
Val Ser Asn Val Ser Lys Lys Asp Ile Glu His Asn Lys Ala Ala His  
50 55 60  
Ser Ser Phe Asp Phe Lys Lys Val Glu Ser Ile Ser Thr Gln Ser Val  
65 70 75 80  
Leu Ala Ala Gln Met Ala Ala Gln Lys Leu Pro Val Ile Gly Gly Ile  
85 90 95  
Ala Ile Pro Asp Leu Lys Ile Asn Leu Pro Ile Phe Lys Gly Leu Asp  
100 105 110  
Asn Val Gly Leu Thr Tyr Gly Ala Gly Thr Met Lys Asn Asp Gln Val  
115 120 125  
Met Gly Glu Asn Asn Tyr Ala Leu Ala Ser His His Val Phe Gly Met  
130 135 140  
Thr Gly Ser Ser Gln Met Leu Phe Ser Pro Leu Glu Arg Ala Lys Glu  
145 150 155 160  
Gly Met Glu Ile Tyr Leu Thr Asp Lys Asn Lys Val Tyr Thr Tyr Val  
165 170 175  
Ile Ser Glu Val Lys Thr Val Thr Pro Glu His Val Glu Val Ile Asp  
180 185 190  
Asn Arg Pro Gly Gln Asn Glu Val Thr Leu Val Thr Cys Thr Asp Ala  
195 200 205  
Gly Ala Thr Ala Arg Thr Ile Val His Gly Thr Tyr Lys Gly Glu Asn  
210 215 220  
Asp Phe Asn Lys Thr Ser Lys Lys Ile Lys Lys Ala Phe Arg Gln Ser  
225 230 235 240  
Tyr Asn Gln Ile Ser Phe  
245

<210> 8  
<211> 198  
<212> PRT  
<213> Bacillus subtilis

<400> 8  
Met Lys Lys Val Ile Pro Leu Phe Ile Ile Ala Ala Gly Leu Val Ile  
1 5 10 15  
Ala Gly Tyr Gly Gly Phe Lys Leu Ile Asp Thr Asn Thr Lys Thr Glu  
20 25 30  
Gln Thr Leu Lys Glu Ala Lys Leu Ala Ala Lys Lys Pro Gln Glu Ala  
35 40 45  
Ser Gly Thr Lys Asn Ser Thr Asp Gln Ala Lys Asn Lys Ala Ser Phe  
50 55 60  
Lys Pro Glu Thr Gly Gln Ala Ser Gly Ile Leu Glu Ile Pro Lys Ile

65           70           75           80  
Asn Ala Glu Leu Pro Ile Val Glu Gly Thr Asp Ala Asp Asp Leu Glu  
85           90           95  
Lys Gly Val Gly His Tyr Lys Asp Ser Tyr Tyr Pro Asp Glu Asn Gly  
100          105          110  
Gln Ile Val Leu Ser Gly His Arg Asp Thr Val Phe Arg Arg Thr Gly  
115          120          125  
Glu Leu Glu Lys Gly Asp Gln Leu Arg Leu Leu Ser Tyr Gly Glu  
130          135          140  
Phe Thr Tyr Glu Ile Val Lys Thr Lys Ile Val Asp Lys Asp Asp Thr  
145          150          155          160  
Ser Ile Ile Thr Leu Gln His Glu Lys Glu Glu Leu Ile Leu Thr Thr  
165          170          175  
Cys Tyr Pro Phe Ser Tyr Val Gly Asn Ala Pro Lys Arg Tyr Ile Ile  
180          185          190  
Tyr Gly Lys Arg Val Thr  
195

<210> 9  
<211> 25  
<212> PRT  
<213> Staphylococcus aureus

<400> 9  
Glu Glu Asn Pro Phe Ile Gly Thr Thr Val Phe Gly Gly Leu Ser Leu  
1           5           10           15  
Ala Leu Gly Ala Ala Leu Leu Ala Gly  
20           25

<210> 10  
<211> 23  
<212> PRT  
<213> Staphylococcus aureus

<400> 10  
Gly Glu Glu Ser Thr Asn Lys Gly Met Leu Phe Gly Gly Leu Phe Ser  
1           5           10           15  
Ile Leu Gly Leu Ala Leu Leu  
20

<210> 11  
<211> 24  
<212> PRT  
<213> Staphylococcus sobrinus

<400> 11  
Asp Ser Ser Asn Ala Tyr Leu Pro Leu Leu Gly Leu Val Ser Leu Thr  
1           5           10           15  
Ala Gly Phe Ser Leu Leu Gly Leu  
20

<210> 12  
<211> 24  
<212> PRT  
<213> Enterococcus faecalis

<400> 12  
Glu Lys Gln Asn Val Leu Leu Thr Val Val Gly Ser Leu Ala Ala Met  
1           5           10           15  
Leu Gly Leu Ala Gly Leu Gly Phe  
20

<210> 13  
<211> 23  
<212> PRT

<213> Streptococcus pyogenes

<400> 13  
Ser Ile Gly Thr Tyr Leu Phe Lys Ile Gly Ser Ala Ala Met Ile Gly  
1 5 10 15  
Ala Ile Gly Ile Tyr Ile Val  
20

<210> 14

<211> 22

<212> PRT

<213> Listeria monocytogenes

<400> 14

Asp Ser Asp Asn Ala Leu Tyr Leu Leu Leu Gly Leu Leu Ala Val Gly  
1 5 10 15  
Thr Ala Met Ala Leu Thr  
20

<210> 15

<211> 5

<212> PRT

<213> Staphylococcus aureus

<400> 15

Arg Arg Arg Glu Leu  
1 5

<210> 16

<211> 9

<212> PRT

<213> Staphylococcus aureus

<400> 16

Arg Arg Asn Lys Lys Asn His Lys Ala  
1 5

<210> 17

<211> 5

<212> PRT

<213> Staphylococcus sobrinus

<400> 17

Arg Arg Lys Gln Asp  
1 5

<210> 18

<211> 7

<212> PRT

<213> Enterococcus faecalis

<400> 18

Lys Arg Arg Lys Glu Thr Lys  
1 5

<210> 19

<211> 5

<212> PRT

<213> Streptococcus pyogenes

<400> 19

Lys Arg Arg Lys Ala  
1 5

<210> 20

<211> 8  
<212> PRT  
<213> *Actinomyces viscosus*

<400> 20  
Lys Arg Arg His Val Ala Lys His  
1 5

<210> 21  
<211> 5  
<212> PRT  
<213> *Streptococcus agalactiae*

<400> 21  
Lys Arg Arg Lys Ser  
1 5

<210> 22  
<211> 6  
<212> PRT  
<213> *Streptococcus pyogenes*

<400> 22  
Lys Arg Lys Glu Glu Asn  
1 5

<210> 23  
<211> 5  
<212> PRT  
<213> Mutated derived from *streptococcus pyogenes*

<400> 23  
Arg Arg Arg Glu Ser  
1 5

<210> 24  
<211> 5  
<212> PRT  
<213> Mutated derived from *streptococcus pyogenes*

<400> 24  
Arg Arg Arg Ser Leu  
1 5

<210> 25  
<211> 5  
<212> PRT  
<213> Mutated derived from *streptococcus pyogenes*

<400> 25  
Arg Arg Ser Glu Leu  
1 5

<210> 26  
<211> 5  
<212> PRT  
<213> Mutated derived from *streptococcus pyogenes*

<400> 26  
Arg Ser Arg Glu Leu  
1 5

<210> 27  
<211> 5  
<212> PRT

<213> Mutated derived from streptococcus pyogenes

<400> 27  
Ser Arg Arg Glu Leu  
1 5

<210> 28  
<211> 5  
<212> PRT  
<213> Mutated derived from streptococcus pyogenes

<400> 28  
Arg Arg Ser Ser Ser  
1 5

<210> 29  
<211> 5  
<212> PRT  
<213> Mutated derived from streptococcus pyogenes

<400> 29  
Arg Ser Arg Ser Ser  
1 5

<210> 30  
<211> 5  
<212> PRT  
<213> Mutated derived from streptococcus pyogenes

<400> 30  
Ser Arg Arg Ser Ser  
1 5

<210> 31  
<211> 19  
<212> PRT  
<213> Mutated derived from streptococcus pyogenes

<400> 31  
His His His His His Ala Gln Ala Leu Glu Pro Thr Gly Glu Glu  
1 5 10 15  
Asn Pro Phe

<210> 32  
<211> 29  
<212> DNA  
<213> Staphylococcus aureus

<400> 32  
aaggattcaa aaggagcggt atacattgc  
29

<210> 33  
<211> 29  
<212> DNA  
<213> Staphylococcus aureus

<400> 33  
aaggatccta cctttcctc tagctgaac  
29

<210> 34  
<211> 283  
<212> PRT

<213> Streptococcus pneumoniae srtA

<400> 34

Met Ser Arg Thr Lys Leu Arg Ala Leu Leu Gly Tyr Leu Leu Met Leu  
1 5 10 15  
Val Ala Cys Leu Ile Pro Ile Tyr Cys Phe Gly Gln Met Val Leu Gln  
20 25 30  
Ser Leu Gly Gln Val Lys Gly His Ala Thr Phe Val Lys Ser Met Thr  
35 40 45  
Thr Glu Met Tyr Gln Glu Gln Asn His Ser Leu Ala Tyr Asn Gln  
50 55 60  
Arg Leu Ala Ser Gln Asn Arg Ile Val Asp Pro Phe Leu Ala Glu Gly  
65 70 75 80  
Tyr Glu Val Asn Tyr Gln Val Ser Asp Asp Pro Asp Ala Val Tyr Gly  
85 90 95  
Tyr Leu Ser Ile Pro Ser Leu Glu Ile Met Glu Pro Val Tyr Leu Gly  
100 105 110  
Ala Asp Tyr His His Leu Gly Met Gly Leu Ala His Val Asp Gly Thr  
115 120 125  
Pro Leu Pro Leu Asp Gly Thr Gly Ile Arg Ser Val Ile Ala Gly His  
130 135 140  
Arg Ala Glu Pro Ser His Val Phe Phe Arg His Leu Asp Gln Leu Lys  
145 150 155 160  
Val Gly Asp Ala Leu Tyr Tyr Asp Asn Gly Gln Glu Ile Val Glu Tyr  
165 170 175  
Gln Met Met Asp Thr Glu Ile Ile Leu Pro Ser Glu Trp Glu Lys Leu  
180 185 190  
Glu Ser Val Ser Ser Lys Asn Ile Met Thr Leu Ile Thr Cys Asp Pro  
195 200 205  
Ile Pro Thr Phe Asn Lys Arg Leu Leu Val Asn Phe Glu Arg Val Ala  
210 215 220  
Val Tyr Gln Lys Ser Asp Pro Gln Thr Ala Ala Val Ala Arg Val Ala  
225 230 235 240  
Phe Thr Lys Glu Gly Gln Ser Val Ser Arg Val Ala Thr Ser Gln Trp  
245 250 255  
Leu Tyr Arg Gly Leu Val Val Leu Ala Phe Leu Gly Ile Leu Phe Val  
260 265 270  
Leu Trp Lys Leu Ala Arg Leu Leu Arg Gly Lys  
275 280

<210> 35

<211> 296

<212> PRT

<213> Streptococcus pneumoniae srtB

<400> 35

Met Asp Asn Ser Arg Arg Ser Arg Lys Lys Gly Thr Lys Lys Lys  
1 5 10 15  
His Pro Leu Ile Leu Leu Ile Phe Leu Val Gly Phe Ala Val Ala  
20 25 30  
Ile Tyr Pro Leu Val Ser Arg Tyr Tyr Arg Ile Ser Asn Glu Val  
35 40 45  
Ile Lys Glu Phe Asp Glu Thr Val Ser Gln Met Asp Lys Ala Glu Leu  
50 55 60  
Glu Glu Arg Trp Arg Leu Ala Gln Ala Phe Asn Ala Thr Leu Lys Pro  
65 70 75 80  
Ser Glu Ile Leu Asp Pro Phe Thr Glu Gln Glu Lys Lys Lys Gly Val  
85 90 95  
Ser Glu Tyr Ala Asn Met Leu Lys Val His Glu Arg Ile Gly Tyr Val  
100 105 110  
Glu Ile Pro Ala Ile Asp Gln Glu Ile Pro Met Tyr Val Gly Thr Ser  
115 120 125  
Glu Asp Ile Leu Gln Lys Gly Ala Gly Leu Leu Glu Gly Ala Ser Leu  
130 135 140  
Pro Val Gly Gly Glu Asn Thr His Thr Val Ile Thr Ala His Arg Gly

145	150	155	160
Leu Pro Thr Ala Glu Leu Phe Ser Gln Leu Asp Lys Met Lys Lys Gly			
165	170	175	
Asp Ile Phe Tyr Leu His Val Leu Asp Gln Val Leu Ala Tyr Gln Val			
180	185	190	
Asp Gln Ile Val Thr Val Glu Pro Asn Asp Phe Glu Pro Val Leu Ile			
195	200	205	
Gln His Gly Glu Asp Tyr Ala Thr Leu Leu Thr Cys Thr Pro Tyr Met			
210	215	220	
Ile Asn Ser His Arg Leu Leu Val Arg Gly Lys Arg Ile Pro Tyr Thr			
225	230	235	240
Ala Pro Ile Ala Glu Arg Asn Arg Ala Val Arg Glu Arg Gly Gln Phe			
245	250	255	
Trp Leu Trp Leu Leu Gly Ala Met Ala Val Ile Leu Leu Leu Leu			
260	265	270	
Tyr Arg Val Tyr Arg Asn Arg Arg Ile Val Lys Gly Leu Glu Lys Gln			
275	280	285	
Leu Glu Gly Arg His Val Lys Asp			
290	295		

<210> 36

<211> 304

<212> PRT

<213> Streptococcus pneumoniae srtC

<400> 36

Met Leu Ile Lys Met Val Lys Thr Lys Lys Gln Lys Arg Asn Asn Leu			
1	5	10	15
Leu Leu Gly Val Val Phe Phe Ile Gly Met Ala Val Met Ala Tyr Pro			
20	25	30	
Leu Val Ser Arg Leu Tyr Tyr Arg Val Glu Ser Asn Gln Gln Ile Ala			
35	40	45	
Asp Phe Asp Lys Glu Lys Ala Thr Leu Asp Glu Ala Asp Ile Asp Glu			
50	55	60	
Arg Met Lys Leu Ala Gln Ala Phe Asn Asp Ser Leu Asn Asn Val Val			
65	70	75	80
Ser Gly Asp Pro Trp Ser Glu Glu Met Lys Lys Lys Gly Arg Ala Glu			
85	90	95	
Tyr Ala Arg Met Leu Glu Ile His Glu Arg Met Gly His Val Glu Ile			
100	105	110	
Pro Val Ile Asp Val Asp Leu Pro Val Tyr Ala Gly Thr Ala Glu Glu			
115	120	125	
Val Leu Gln Gln Gly Ala Gly His Leu Glu Gly Thr Ser Leu Pro Ile			
130	135	140	
Gly Gly Asn Ser Thr His Ala Val Ile Thr Ala His Thr Gly Leu Pro			
145	150	155	160
Thr Ala Lys Met Phe Thr Asp Leu Thr Lys Leu Lys Val Gly Asp Lys			
165	170	175	
Phe Tyr Val His Asn Ile Lys Glu Val Met Ala Tyr Gln Val Asp Gln			
180	185	190	
Val Lys Val Ile Glu Pro Thr Asn Phe Asp Asp Leu Leu Ile Val Pro			
195	200	205	
Gly His Asp Tyr Val Thr Leu Leu Thr Cys Thr Pro Tyr Met Ile Asn			
210	215	220	
Thr His Arg Leu Leu Val Arg Gly His Arg Ile Pro Tyr Val Ala Glu			
225	230	235	240
Val Glu Glu Glu Phe Ile Ala Ala Asn Lys Leu Ser His Leu Tyr Arg			
245	250	255	
Tyr Leu Phe Tyr Val Ala Val Gly Leu Ile Val Ile Leu Leu Trp Ile			
260	265	270	
Ile Arg Arg Leu Arg Lys Lys Lys Gln Pro Glu Lys Ala Leu Lys			
275	280	285	
Ala Leu Lys Ala Ala Arg Lys Glu Val Lys Val Glu Asp Gly Gln Gln			
290	295	300	